

REMARKS

A number of amendments, as set forth above, have been made to the specification, all of which are clarifying in nature and add no new matter.

In the amendment on page 3, the proper word -- supporting -- has been inserted. This word is used consistently throughout the specification, as for example in the sentence beginning in line 1 on page 6.

On page 6, an amendment has been made to specifically describe the thin nature of the flexible lips 23 which are the subject matter of amended claims 1 and 17. This feature is clearly shown in Figs. 2a and 5, was the subject matter of cancelled claim 4, and is also recited in the Summary of the Invention, page 2, line 28.

Claims 1-19 stand rejected under 35 USC §102(b) as anticipated by Kelly et al (U.S. 5,779,984). The Examiner finds that Kelly et al discloses each of the limitations recited in the claims. Specifically, the Examiner quotes from the recitation in Kelly et al beginning in line 55 of column 8 and continuing to line 64.

The foregoing rejection is respectfully traversed and reconsideration is requested in view of the amendments to the claims above and the comments which follow.

Although the construction and operation of the Kelly et al pipette dispensing system are similar in a general manner to applicants', there are significant differences in both the construction and operation that are now more clearly set out in the amended claims and distinguish over the Kelly et al reference. In Kelly et al, there is a support plate (50) that is generally comparable to applicants' transfer plate 20 and includes flexible flaps (58) surrounding the holes (52) through which the tapered lower ends of the pipette tips (20) extend and upon which the intermediate shoulders (20S) of the tips rest. In addition, Kelly et al discloses the use of a push plate (56) that pushes the tips resting on the flexible flaps (58) downwardly past the flaps until they drop and are supported by their shoulders (20S) in the holes of the tray (62).

However, the Kelly et al system uses a housing (54) in which tiers of nested tips are held with the push plate (56) engaging the upper ends of the tips in the uppermost tier to push all tiers vertically downwardly until the lowermost tier passes the

flexible flaps (58) on the support plate (50), thereby releasing the tips to drop into the holes of the tray (62). The vertical nesting of the tips requires that an entire vertical column of tips, plus the distributed weight of the push plate (56), be supported by the flexible flaps (58) surrounding the holes in the support plate (50). This requires the flexible flaps to be substantially heavier and more stiff to support the static weight of the column of tips. When the push plate (56) is pressed downwardly to dispense the lowermost tier of tips, the interior projections (74) in the housing (54) provide an indexing function for the push plate. However, this indexed movement of the push plate does not assure accurate and positive dispensing of the lowermost tier or of all of the tips in that tier. Prior to dispensing, the lowermost tier to be dispensed, e.g. tier 44 in Fig. 7a, is supported on the support plate (50) with the tip shoulders (20S) resting on the support plate and, presumably, on the flexible flaps (58), although this is not completely clear from the drawings or the description. As the push plate (56) is pressed downwardly within the housing (54), tiers (44, 46, and 48) move downwardly together by engagement of the shoulders (20S) of tiers (46 and 48) with the tops of the tips of the next lower tiers (46, 44) respectively. When the upper ends of the tips in tier (44) move downwardly to the position where they reach the support plate (50) the shoulders (20S) of the tips in the tier (46) immediately above are located in the same horizontal plane as the upper ends of the tips in tier (44), i.e. at the level of the support plate (50). In this position, downward movement of larger diameter upper (proximal) ends (20P) of the tier (44) tips will have presumably deflected the flexible flaps (58) as these larger diameter upper end portions pass through the support plate holes (52). However, there is no teaching whatever in Kelly et al that this construction assures that the upper ends of the tier (44) tips will have cleared and not be hung up on the flexible flaps such that the tips are unable to drop by gravity the short distance into the holes in the tray (62) of the pipette tip rack (64). This is especially problematic when one considers that the flexible flaps (58) must be relatively thick to support the long vertical columns of tips, as mentioned above. The thickness of the flexible flaps (58) is not shown in the drawings or described in the specification and, with respect to Fig. 6, one must assume that the flaps (58) are the same thickness as plate material surrounding the holes (52).

In applicants' system, by comparison, the flexible lips 23 are substantially thinner than the flat body portion 21 of the transfer plate 20. The flexible lips 23 are just thick enough to support a single pipette tip 11 and a distributed portion of the weight of the upper push plate 36, but not the added weight of a vertical column of tips.

In addition, applicants' system utilizes a push plate construction that positively assures that the upper ends of the tier of pipette tips being transferred completely clears the flexible lips 23 as the tips descend past the transfer plate 20. Referring particularly to Fig. 7, the downwardly depending fingers 38 on the push plate include cylindrical proximal ends 41 that define a lower flat annular shoulder 42. The shoulder 42 engages the vertical end of the pipette tip (see the phantom line portion of Fig. 7) and pushes it downwardly until the shoulders 42 have cleared the flexible lips 23, thereby assuring that the tips have also cleared and are free from being hung up on the flexible lips.

Applicants' tip reloading system also utilizes a unique support structure, formed with and depending downwardly from the underside of the transfer plate, to hold the tiers of tips in a vertically stacked orientation (Fig. 2) from which the uppermost tier (and the push plate 36) are removed and placed over the empty pipette tip holder (Fig. 3) to reload the same. The support structure 26 comprises legs 27 formed integrally with the transfer plate main body portion 21. The length of the legs 27 is selected such that the tips of one tier extend a short distance into the tips of the tier immediately below, but prevent supporting contact between vertically adjacent tips. This prevents the entire load of a vertical column of tips from resting on the flexible lips of a single transfer plate, as is characteristic of Kelly et al and other prior art. Similarly, when the upper tier of tips is lifted with the transfer plate and push plate and placed on an empty pipette holder 10, as shown best in Fig. 6, the legs 27 of the support structure 26 support the pipette tips engaging the support surface 12 of the tip holder 10 until transfer is effected by pressing the push plate 36 downwardly on the array of tips, until the tips are moved past and separated completely from the flexible lips 23 on the transfer plate 20.

The foregoing features are now recited in new claims 20 and 21 and, because these features are neither shown nor suggested in the prior art, the claims are believed to be allowable.

Kelly et al fails to disclose, teach or suggest the use of flexible lips that are substantially thinner than the flat plate body in which they are formed, the use of push plate fingers that positively assure that the tips being dispensed are freed from the flexible lips, or the use of tiered transfer plates with plate-to-plate support structure that maintains vertical separation and prevents contact between tips. These features provide a substantial improvement in the dispensing of pipette tips that assures smooth, uniform and consistent transfer of all tips in an array which may comprise 96 or more tips.

Independent apparatus claim 1 and independent method claim 17 have been amended to recite these important features. Independent method claim 12 has been cancelled, as have dependent claims 3, 4 and 14-16. The remaining claims, including new claims 20 and 21, are believed to be in condition for allowance and further favorable action is respectfully requested.

Respectfully submitted,

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